Clean Air, Healthy Children

Teacher's Guide and Activities for Young Children

Wisconsin Department of Natural Resources
Bureau of Communication and Education
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Introduction

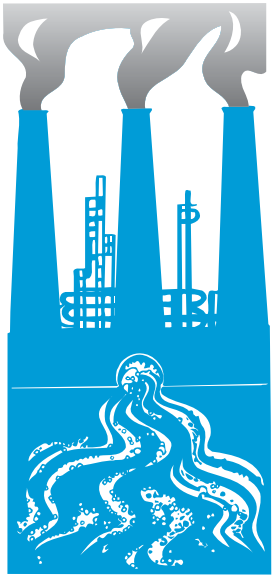
Air pollution is a global health issue of growing concern. It contributes to acid rain formation, ozone depletion, and climate change. Air pollution not only harms buildings and plant life, but it negatively impacts human health as well. Though generally thought of as an urban dilemma, it poses a health threat in rural areas as well.

Today's children are tomorrow's leaders. As role models, parents and educators need to teach children how to care for the environment. Air is a resource for which the supply is seemingly endless. It is often taken for granted and abused through human actions. A great deal of air pollution stems from our everyday activities, and there are several basic lifestyle changes we can make to protect this precious resource. Through education and role modeling, adults can lead children into a brighter, cleaner future.

These educational materials are designed to introduce preschool children to the concepts of respiratory health, air quality, and caring for the environment. Background information on children's respiratory health issues and air pollution is provided for the educator. The lesson plans incorporate in-class and take-home activities to create an introduction to respiratory health, the environment, and air quality for both children and their families.

This plan is divided into five sections that can either be used in sequence as a complete unit or separately as they fit into your curriculum. The unit also provides the flexibility to use individual activities as they apply to your own lessons.

Air & Respiratory Health Background



Today's children live in a world very different from past generations. Advances in science and technology have diminished infectious diseases such as polio and measles. These advances have also increased infants' survival rates during the vulnerable first year of life and have enabled children to grow into adulthood. Unfortunately, technological advances also have negative consequences. Exposure to environmental pollutants has threatened the health of all people through contaminated water and polluted air.

Health Consequences of Air Pollution

Outdoor air pollution impacts the respiratory health of everyone, regardless of age and health status. Air pollution can affect our immune system, which is our defense system against infections. Air pollution can also affect our airways and lungs reducing the amount of oxygen we take into our body. We can experience symptoms that range from mild irritation to the nose, eyes, and throat, to having less ability to do exercise outdoors. Air pollution can increase the risk of having a respiratory infection. Children, the elderly and persons with asthma are impacted the most by air pollution.

Children at Risk

Children are more susceptible to the effects of air pollution for several reasons related to their physical development and behavior.

- Children's respiratory organs are not fully developed and thus are more vulnerable to toxic substances in the air.
- Children have narrower airways that are more severely affected by the tissue inflammation that occurs due to air pollution.
- Children have weaker immune systems that are more vulnerable to the foreign substances found in air pollution.
- Children inhale more air (and more air pollution) per pound of body weight than adults.
- Children often breathe through their mouths, rather than their noses. This route bypasses the cilia and mucous found in the nose that trap foreign particles in the air and stop them from entering the lungs.
- Children do not recognize or acknowledge the effects of air pollution as quickly as adults. This may exacerbate the effects of air pollution, because symptoms are not treated as quickly.

Children and Asthma

Asthma is the leading serious chronic illness of children. One third of all individuals affected by this disease are under the age of 18. Preschool children have the highest rate among all children with asthma. Most children with asthma develop their symptoms by age five. Because outdoor air pollution can cause an asthma episode, the high asthma rates found among children makes this group a target population for air education programs. Young children, their parents, and educators benefit from learning methods for controlling asthma triggers, including how to protect children from air pollution. Reducing air pollution can play an integral role in protecting the respiratory health of young children.

Asthma Basics

The following information provides an introduction to asthma with commonly asked questions.

What is Asthma?

Asthma is a chronic lung disease that can restrict a child's ability to breathe.

What is an Asthma Episode?

During an asthma episode or attack the airways narrow and it becomes difficult to breathe. There are three factors that contribute to this occurrence:

1. The muscles around the airways tighten, narrowing the airways;
2. The airways narrow and are blocked due to swelling and inflammation; and
3. More mucus than usual is produced inside the airways, further blocking them.

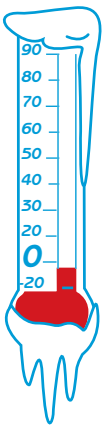
What Causes an Asthma Episode?

Episodes of asthma are usually caused by some condition or stimulus commonly referred to as an asthma trigger. Triggers vary between children and the following list is not all-inclusive.

air pollution

tobacco smoke

pets



dust mites

aerosols, perfumes, and strong odors

cockroaches

wood smoke

exercise

viral respiratory infection

cold air/weather change

What are the Warning Signs and Symptoms of an Asthma Attack?

The Main Symptoms of an Asthma Attack Are:

Shortness of breath	Wheezing
Tightness in the chest	Persistent cough

Warning signs are physical changes that can occur before an asthma episode becomes evident. Warning signs can be recognized hours or days before more obvious symptoms appear. Children will have different signs at different times. The most common warning signs include changes in breathing patterns:

Coughing	Shortness of breath
Wheezing	Rapid breathing
Breathing through the mouth	

Children May Also Experience:

Being easily out of breath	Achy chest
Dark circles under eyes	Mood changes

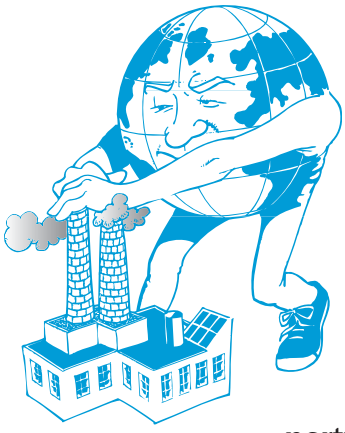
Some children can experience allergy symptoms, such as a stuffy nose and itchy watery eyes, prior to showing asthma symptoms.

What Types of Medication Help Treat Asthma?

There are many different forms of medications for asthma available through a doctor's prescription. The most common form is the inhaler and medications given through a nebulizer. Asthma medications are used for two main purposes:

1. To help control and prevent airway inflammation. These are also called anti-inflammatory medications. These medications prevent asthma episodes and must be taken on a daily basis.
2. To help relieve asthma symptoms by relaxing the muscles around the airways. These include the bronchodilators. These medications are used during an asthma episode to help open the airways and are taken as needed.

Air Pollution and its Sources



There are several types of air pollution. The United States Environmental Protection Agency (US EPA) monitors six criteria air pollutants through the National Ambient Air Quality Standards (NAAQS): particulate matter, sulfur dioxides, carbon monoxide, nitrogen dioxide, ozone, and lead. Wisconsin experienced a significant decrease in the level of these pollutants between 1980 and 1997. However, air pollution still impacts the health of Wisconsin residents, particularly children. Outdoor air pollution, including the particulate matter, carbon monoxide, and hydrocarbons emitted during the burning of yard waste, garbage, and wood irritate the respiratory system. Ground-level ozone, the main ingredient of urban smog, is also detrimental to the respiratory system. These forms of air pollution can significantly impact the respiratory health of children by altering the structure and function of their respiratory organs.

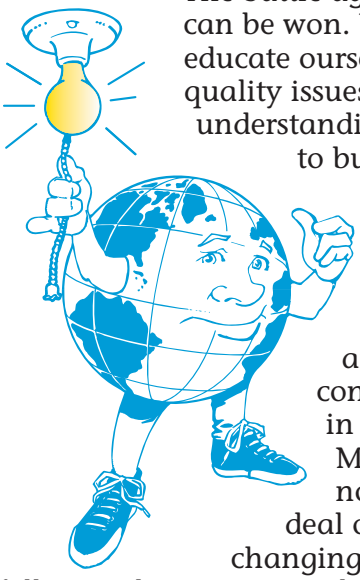
Particulate matter is small particles, composed of almost any compound, that are present in air pollution. They can penetrate deeply into the lungs and aggravate existing lung disease in addition to damaging the lung, impairing breathing, and altering the immune system. This pollutant can slow down the exchange of oxygen and carbon dioxide, which causes shortness of breath and increases the workload of the heart.

Carbon monoxide is also dangerous to our health. It is the result of incomplete combustion from sources such as automobiles. Carbon monoxide binds to hemoglobin, which carries oxygen in the blood. Therefore, this pollutant hinders the respiratory process by reducing the amount of oxygen delivered to our muscles and organs.

Hydrocarbons are substances that irritate the respiratory system and are released during fuel combustion and the burning of leaves, garbage, and wood.

Ground-level ozone, a colorless, odorless gas that reacts rapidly and strongly with living tissues, is the main ingredient in urban smog. It is a secondary pollutant that is not directly emitted into the air, but is produced through a chemical reaction between nitrogen oxides (NOx) and volatile organic compounds (VOCs) in sunlight. The primary sources of NOx and VOCs are on-road vehicles and power plants. Its health effects include increased susceptibility to respiratory infection as well as impaired lung function. High concentrations cause shortness of breath, coughing, wheezing, and pain with deep breaths. Ozone Action Days are crucial to protecting ourselves on days when ozone levels are high.

Solutions



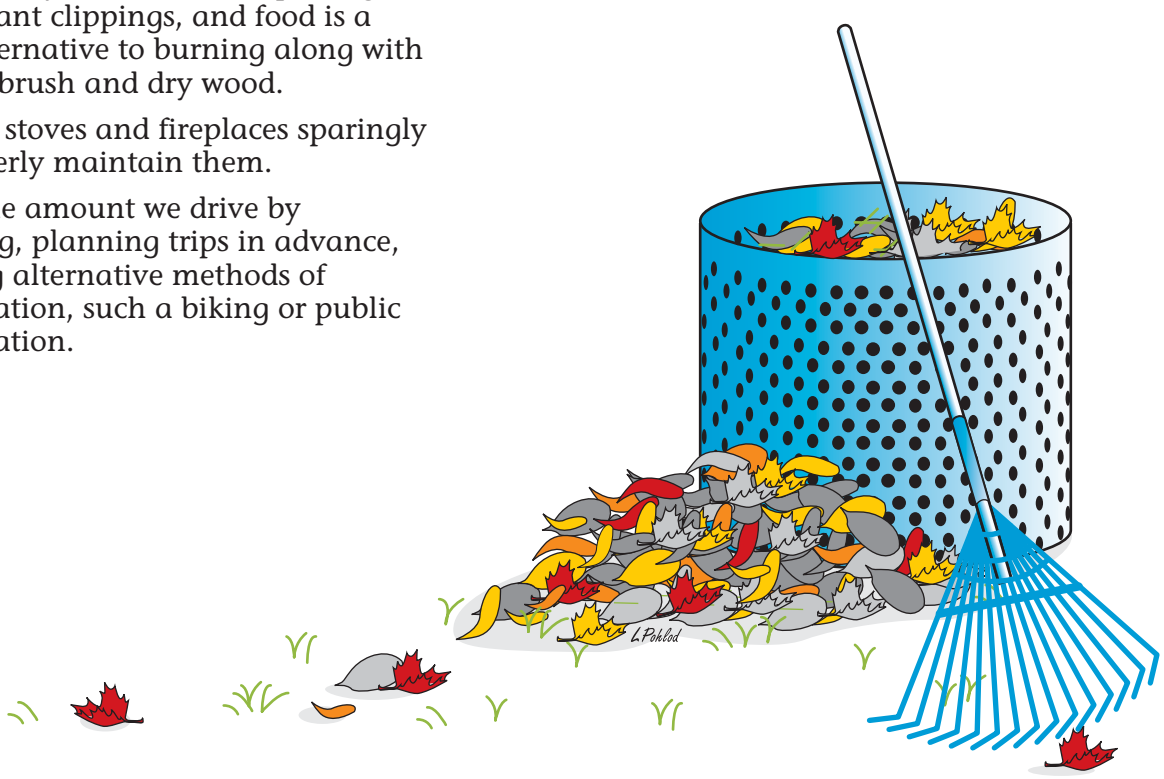
The battle against air pollution can be won. We must first educate ourselves about air quality issues, which includes understanding and adhering to burning regulations in our areas and following Ozone Action Day procedures. This knowledge will aid in making 'air conscious' decisions in our daily lives. Many changes do not require a great deal of effort beyond changing old habits. The following list cites several easy steps to minimize air pollution:

- Eliminate the burning of refuse by reducing the amount of garbage we generate. This can be done through buying materials in bulk, reusing items or donating the to a resale organization, and recycling.
- Do not burn yard waste. Composting leaves, plant clippings, and food is a viable alternative to burning along with chipping brush and dry wood.
- Use wood stoves and fireplaces sparingly and properly maintain them.
- Reduce the amount we drive by carpooling, planning trips in advance, and using alternative methods of transportation, such a biking or public transportation.
- Tightly seal containers of household chemicals and gasoline to reduce the evaporation of VOCs into the atmosphere.

- Reduce energy consumption at home by weather-stripping, using fluorescent lights, and thermostat controls. Be sure to turn off lights and appliances when they are not in use.

These actions will lead to a decreased demand on the use of coal and oil at power plants and will decrease our electricity bills.

As we become more aware of air pollution and health issues, we can become better prepared to address them.



Our Respiratory System

Lesson Focus

Breathing is something that most of us do without even being aware of it. We breathe nearly 25,000 times per day, taking in nearly 10,000 liters of air. Children breathe even more air per pound of body weight than adults. This lesson is designed to teach children how we breathe and introduce them to the basic components of the respiratory system.

Our respiratory system includes our nose, mouth, throat, windpipe, and lungs. The function of the respiratory system is to supply oxygen to our muscles, organs, and tissues and remove carbon dioxide from the blood. The airways in the nose, throat, and windpipe are lined with mucous and cilia that trap dust and foreign particles inhaled from the environment. Air enters the nose, passes through the windpipe and throat before filling the lungs. The exchange of oxygen and carbon dioxide takes place in tiny air sacs in the lungs called alveoli.

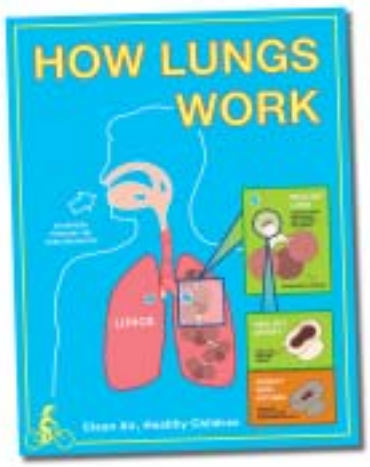
The effects of air pollutants and respiratory illness make breathing difficult for children. Air pollution can hinder the function of the respiratory system by diminishing the body's natural defense system. Effects can range from irritation and discomfort to even death. Respiratory illnesses, such as asthma, restrict airflow by constricting the airways. Review the air pollution and asthma basics sections of the Background for further information.

Class Activities

Activity # 1

Materials Needed:

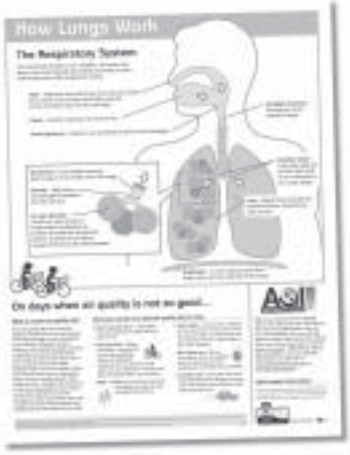
How Lungs Work poster (included in guide).



Have the children focus on their own breathing and concentrate on how the air feels traveling through their respiratory system. Explain that the nose and mouth are connected. Demonstrate this interconnectedness by having the children perform the following exercise:

- First, ask the children to place their hands on their chests while breathing. Describe.
- Next, focus on inhaling through the nose by covering the mouth with the hand.
- Next, focus on inhaling through the mouth by pinching the nose.
- Note the rise and fall of the chest with inhalation and exhalation.

Use the *How Lungs Work* poster to trace the route of oxygen as it travels through the body.



Explain that some children have a hard time breathing because they have asthma. These children take medicine to help them breathe.

Activity # 2

Materials Needed:

Stop watch or clock.

- Have the children sit for 30 to 60 seconds. Ask them how they feel.
- Have the children do any activity, such as jumping jacks, running in place, or hopping for 30 to 60 seconds.
- When they are finished, ask them whether the are breathing faster or slower than before exercising.
- Discuss how they feel after exercising.
- Explain that when they breathe, they are taking in oxygen and blood is carrying it to the muscles.
- Explain that they are breathing harder to take in more oxygen when they exercise. This is because they are working harder and need to get more oxygen to the muscles.

Activity #3

Materials Needed:

Activity Worksheet #1.

- Have the children trace the pathway of the respiratory system and color each part a different color.
- Each child can make a book about his or her own respiratory system using the student activity worksheet #1.
- Copy the pages onto transparencies.
- Construct the book in numerical order building the respiratory system with each additional page.
- Have children draw pictures of themselves as covers for their books.

School - Home Link

Materials Needed:

School-Home Link #1.

Children will take home a letter to their parents describing the unit and inviting the parents to participate.

Books

You Breathe In, You Breathe Out by David Adler

The Respiratory System by Helen Frost

All About Asthma by William Ostrow & Vivian Ostrow

(A True Book) The Respiratory System by Darlene R. Stille

Songs

'Breathe, Breathe, In and Out'

(melody of Row, row, row your boat)

Breathe, breathe
In and out
Taking in clean air
Through the nose
To fill the lung
And out the mouth
Exhale!

School-Home Link #1

Dear Parents,

We are beginning a new unit about our health and the environment. We will be learning about our respiratory system, our own environment, and the air around us. We will be sending home information and activities, so that you can participate in your children's learning experiences.

The activities will focus on the following themes:

1 Our respiratory system

2 The world around us

3 Air is everywhere

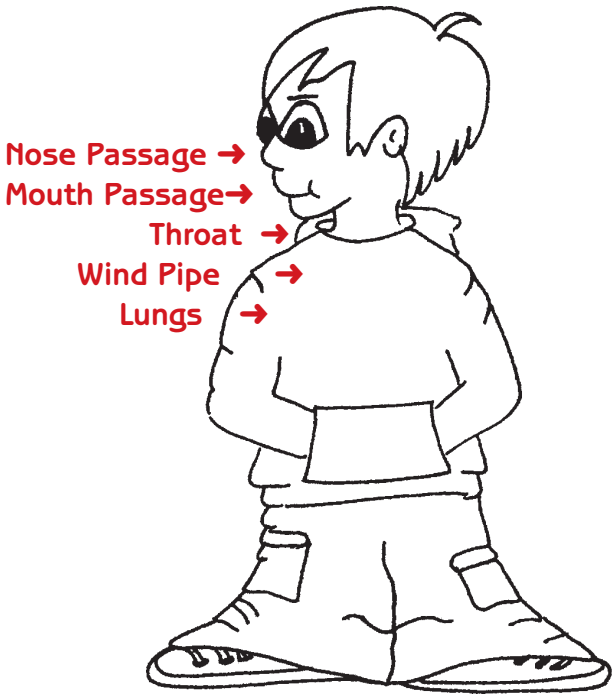
4 Air pollution patrol

5 Pitching in

We invite you to join us in the learning activities, so we can work together to keep our environment safe and healthy for our children!

Best of Health

Activity Worksheet #1



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2

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The World Around Us

Lesson Focus

This lesson is designed to introduce children to the concept of environment. The term environment is defined as all the conditions, circumstances, and influences surrounding and affecting us. Young children should begin to understand that the different forces in their environment are interdependent. Children's environments provide the basic needs of clean air, water, and food. Therefore, we must take care of the environment to keep it healthy and safe. The focus of this lesson is on the most immediate surroundings for children: the classroom and the home. The importance of taking care of these environments should be emphasized.

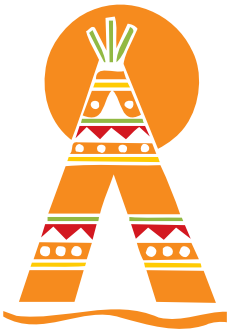
Class Activities

Activity #1

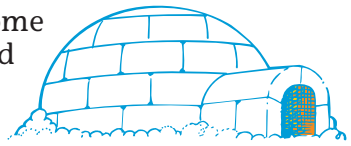
Materials Needed:

Magazine pictures of various settings.

- Begin by explaining that our environment includes everything around us. This includes the classroom, our homes, or any place we live.



- Ask the children to identify different objects in the classroom environment.
- Discuss how we take care of things in the classroom.
- Explain that our homes can be another kind of environment.
- Explain that different families live in different types of places. Show pictures of different types of homes: houses, apartments, farms, igloos, huts.
- Ask the children to describe their home environment and the type of things in them.



Activity # 2

Materials Needed:

Paper bags (one per child)

Sheets of paper

Crayons

Glue

- Take the children on a field trip to the playground or nearby park.
- Select a tree in the area that the class will 'adopt.' Talk about the types of animals that make their homes in the trees. Stress the importance of keeping their homes clean and safe.
- Supply each child with a paper bag in which they can store objects collected from the ground around the tree: bark, twigs, leaves, etc.
- Stress the importance of protecting the environment and not harming plants and animals in nature. Explain to the children that they should not take anything off the tree, but rather pick objects from the ground.
- Ask the children to make rubbings from leaves, bark, etc.
- After returning to the classroom, discuss the importance of trees. What would happen if trees could not grow? Where would the animals that lived in the trees go?
- Ask the children to make a class book about the tree. Using sheets of paper with an outline of a tree, ask the children to glue their gathered objects to the tree. Staple the sheets together to form a book.

- Periodically check on the tree throughout the seasons and note the changes in the tree, such as the amount and color of the leaves and movement in the leaves caused by the air.

School-Home Link

Materials Needed:

Activity Worksheet # 2.

- Send the activity worksheet # 2 home with the child.
- The parent(s) will help the child match cleaning action pictures with the appropriate area of the home as they discuss what they do to take care of their home environment.

Books

What We can do about Protecting Nature by Donna Bailey

Recyclables Fun: Creative Craft Ideas by Diane Cherkerzian

Recycle! A Handbook for Kids by Gail Gibbons

Love Earth: The Beauty Makeover by Shelly Nielsen

Songs

'Ring Around the Tree'

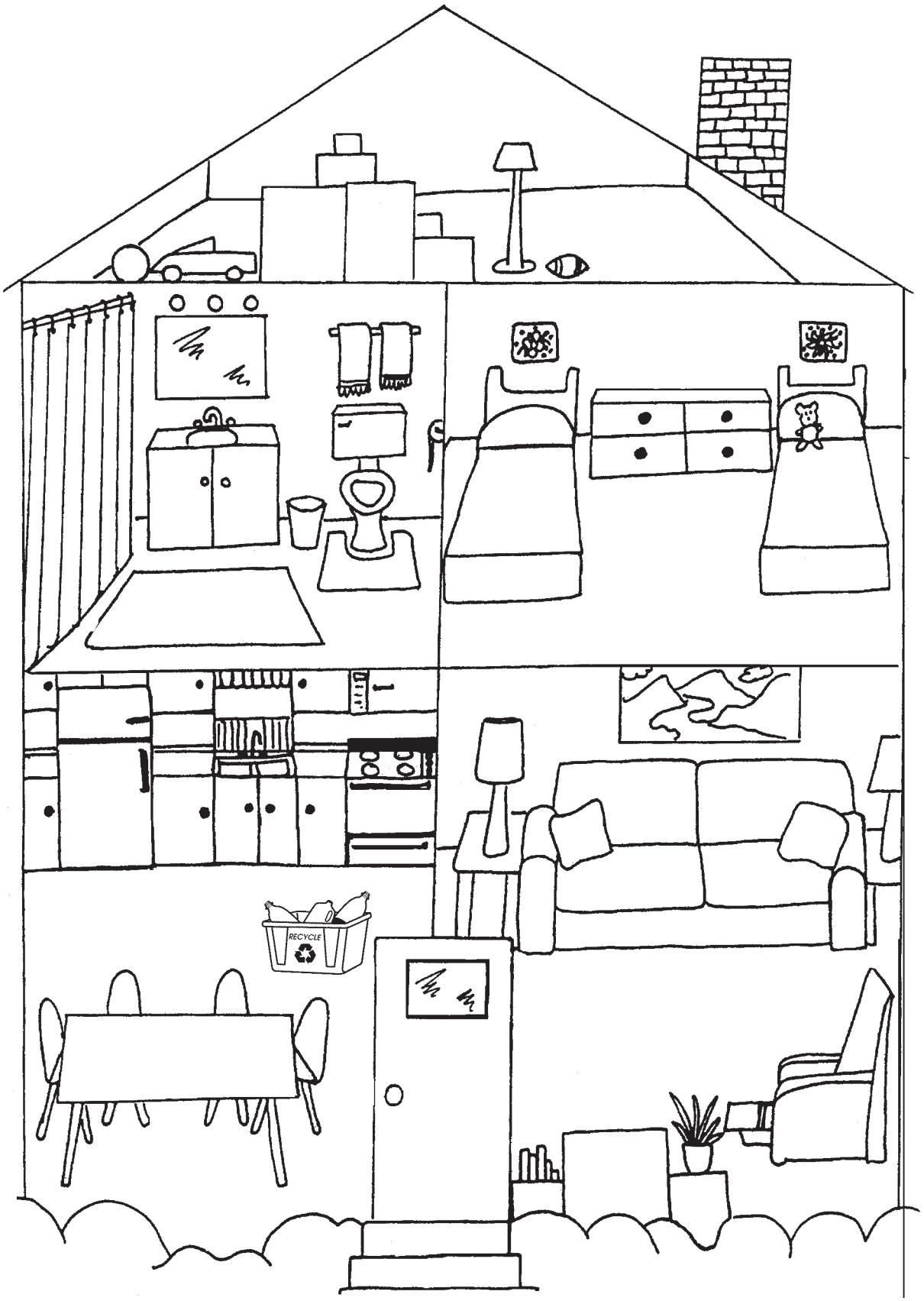
(melody of 'Ring Around the Rosey')

Gather the children in a circle around a tree. Have the children hold hands while they sing and move the circle clockwise.

Ring around the tree
Pocket full of leaves
Autumn, Autumn
They all fall down

(Children drop hands as they fall down)

Student Activity Worksheet #2



RecycleStudent Activity Worksheet #2

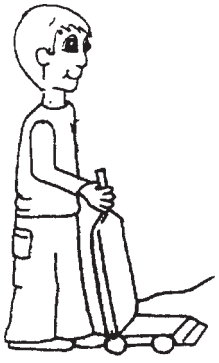
Match the Activity with the Picture

We are learning about our environment and how we can work together to keep it clean and safe. Since our home is a very important environment we must learn to keep it healthy for the entire family.

Please help your child learn to care for your home environment by matching the pictures of cleaning activities to the proper locations in the home. With your child, cut the figures below and paste them to the proper rooms on the drawing. Talk about the importance of keeping your home clean.

Recycle Paper, Newspaper and Plastic Bottles

Flush the Toilet



Vacuum the Rug

Make the Bed

Air Is Everywhere

Lesson Focus

The air is all around us in our environment, and we take it into our bodies every time we breathe. This air consists primarily of oxygen and nitrogen in addition to small amounts of other gases, bacteria, and viruses. Clean air is essential to our health, because it provides the necessary oxygen to sustain life. Oxygen cannot be stored and only a limited reserve exists in the blood. Therefore, a continuous supply is necessary for our body to function. This lesson demonstrates how we know the air is around us by using different senses.

In-Class Activities

Activity #1

Materials Needed

The March Wind poem, recording of wind.

- Ask the group: What is Air?
- Ask if anyone can see the air. Explain that air is all around us, even though we cannot see it.
- Remind the group that we take in air every time we breathe. Focus on inhaling and exhaling.
- Ask the children what air is called when it is moving.
- Ask them how can we tell if it is windy.
- Return to the 'class tree' to see if air is moving through its leaves.
- Have the children create their own wind by blowing into their hands or fanning themselves with their hands.
- Ask children how they hear (ears). Talk about different sounds: music, car horns, animal sounds.
- Play a recording of the sound of wind blowing through trees and ask children what they hear. Discuss how it feels to walk outside on a windy day.

The March Wind

This interactive poem combines creative movement with language development as children learn about wind and air.

The March wind is a silly clown

He blows the leaves up

(stretch up arms, stand tippy-toed)

He blows the leaves down

(sit down on the floor)

He blows the leaves all around

(stand up and turn around)

He blows them to the left

(move to the left)

He blows them to the right

(move to the right)

And now he's going to blow my kite

(make believe you're holding a kite)

Activity # 2

Hide and Seek With Scents

Materials Needed:

Small boxes with covers, fresh onions, lemons, oranges, or flowers.

- Ask the children if they can smell things in the air. Ask them how they smell things (with their nose). Talk about different kinds of smells: flowers, baking cookies, and smoke.
- Place different objects with distinct scents, such as onions, lemons, oranges, and flowers, in small boxes with holes in the covers. Have pictures of each object in the boxes. Ask the children to match the scents to the pictures of the objects.

Activity # 3

Materials Needed:

Paper, very light tempera paints or powder drink mix and water, straws.

- Each child will paint a picture by blowing air through a straw.
- Begin this activity by having children practice blowing feathers using their straws.
- Place small drops of paints/drink mix on white paper.
- Have children 'paint' a picture by blowing paint/drink mix across the paper using a straw. Remind the children to blow out, not breathe in.

School-Home Link

Materials Needed:

School-Home Link #3.

- 4-inch squares of white tagboard, clear plastic wrap, petroleum jelly, 12-inch pieces of string, paper hole punch, tape.
- Cover tagboard squares with plastic wrap.
- Punch hole in one corner.
- Loop string through hole and tie.
- Cover one side of the square with a thin layer of petroleum jelly.
- Ask the children to take their wind catchers home to see what they can catch.
- Hang in an observable site for 2 days.
- Observe what is caught in the jelly.

Books

Air by Andrew Charman

Flying and Floating by David Glover

In the Air by Henry Pluckrose

Songs

'Air is Everywhere I Go'

(melody of 'Mary had a Little Lamb')

Air is everywhere I go
Where I go, where I go
Air is everywhere I go
And this is how I know!

I feel it brush against my face,
'gainst my face, 'gainst my face,
I feel it brush against my face
When the wind does blow!

Air is everywhere I go
Where I go, where I go
Air is everywhere I go
And that is how I know!

I hear it blowing through the trees
Through the trees, through the trees
I hear it blowing through the trees
It whistles as it goes!

I see it filling my balloon
My balloon, my balloon
I see it filling my balloon
And watch it as it grows!

Dear Parents,

We are learning about the air around us in our environment. We know that moving air is called the wind. The wind can carry many different things such as dust, smoke, and pollen. We have made 'wind catchers' in order to see what is carried by the wind near our home environment.

Please help your child 'catch' materials carried by the wind by hanging the wind catcher outside of your home. After 2 days, bring it inside and see what you have caught!

Best of Health

Air Pollution Patrol

Lesson Focus:

There are a variety of air pollution sources that are a result of human actions. In fact, much of our basic lifestyle creates pollution. Primary sources of ground-level ozone ingredients are emissions from automobiles, small engines, such as lawnmowers and motor boats, non-engine sources, including paints and chemicals, and industrial emissions. Burning yard waste and garbage along with wood burning stoves are also sources of air pollution. These activities emit several gases including carbon monoxide, particulate matter, and hydrocarbons that pose significant health threats. See the air pollution section of the Background for further information.

Class Activities

Activity # 1

Materials Needed

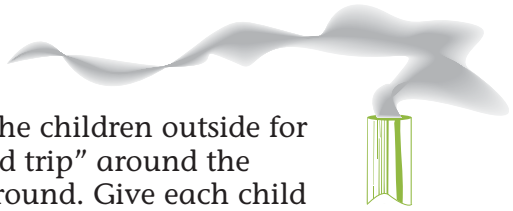
Long candle, pyrex cover.

- Review the concept of environment. Explain the pollution is anything that makes our environment dirty.
- Ask, where is the air? Explain to the children that the air around us can get dirty. Sometimes we are able to see it (like smoke from a chimney), but sometimes we may not be able to. Remind children of the things they caught with their wind catchers.
- Explain that when the air gets dirty it is called air pollution. Air pollution can cause itchy eyes, coughing, and difficulty breathing. It also hurts the environment.
- Demonstrate the smoke can make things dirty by lighting a candle and then covering it with the pyrex cover. The remaining soot will demonstrate how smoke can make things dirty.

Activities # 2

Materials Needed

Wet wipes, pictures of air pollution sources.



- Take the children outside for a "field trip" around the playground. Give each child a damp cloth to wipe one surface. Each child should wipe a different surface.
- After returning to the classroom, ask the children to share their experiences with the group: show their cloth and tell what object they wiped.
- Explain to the children that dirt in the air makes things outside dirty and can make it difficult to breathe.
- Show the children pictures of air pollution sources: cars, factories, burn barrels, leaf burning, smoke emitted from chimneys, aerosols, chemicals, etc.

School-Home Link

Materials Needed:

School-Home Link # 4.

Send home the Air Pollution Patrol Fact Sheet for parents.

Books

Air Pollution by Rhonda Lucas Donald

Polluted Air by John M. Patten, Jr.

Air Pollution by Darlene Stille

Air Pollution Patrol Fact Sheet

We invite you to join us in educating your child about air pollution and methods of controlling it. The following information identifies various types of pollution, their sources, and health effects. These effects can be experienced by even the healthiest of individuals. However, they are most dangerous for children, the elderly, and people with respiratory illnesses, such as asthma. Humans create a variety of sources of air pollution during the course of everyday life. By becoming aware of how we create air pollution, we can become better able to reduce it.

Ground-level Ozone: A secondary pollutant formed by the reaction of nitrogen oxides and volatile organic compounds in sunlight. These ingredients are found in automobile exhaust; gasoline and oil storage and transport; use of paint solvents, cleaning fluids, and ink solvents; and incompletely burned coal, wood, and other fuels. Though it cannot be seen or tasted, ozone can cause cough and wheezing, shortness of breath, and chest pain. Ozone Action Days are called when weather forecasters predict hot, humid weather conditions that are likely to cause high levels of ozone.

Carbon Monoxide: Carbon monoxide is created by automobile emissions in addition to home and building heating. It inhibits the body's ability to deliver oxygen to the cells and can cause shortness of breath.

Particulate Matter: Particulate matter is tiny airborne particles or aerosols found in the atmosphere. Vehicle exhaust, wood burning, and combustion of petroleum products create it. Particulate matter lodges deeply

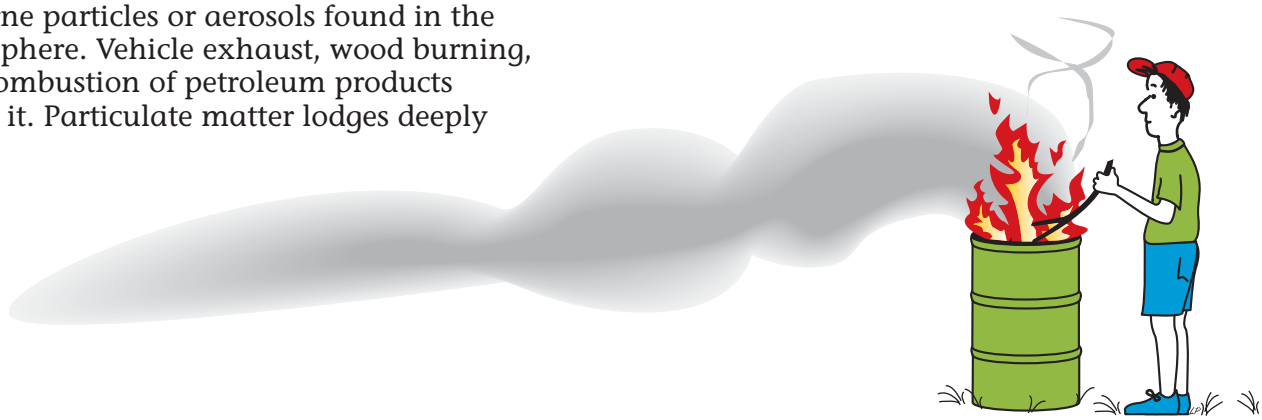
into the lungs and can aggravate existing respiratory diseases, damage lung tissue, impair breathing, and decrease the body's immune system.

Hydrocarbons: Hydrocarbons are gases that are created by incomplete combustion from sources such as the burning of garbage, yard waste, and wood. These gases cause irritation of the eyes, nose, throat, and lungs, and some can cause cancer.

Human Actions Leading to Air Pollution:

- Cars and trucks
- Garbage burning
- Yard waste burning
- Furnaces
- Off-road vehicles

To learn more about what you can do to better air quality in your area log onto http://dnr.wi.gov/org/aw/air/.



Pitching In

Lesson Focus

Individual actions can make a difference in the battle against pollution. This lesson is designed to help children and their families recognize individual actions to help protect the environment and decrease air pollution. A great deal of air pollution sources stem from human activities. Alternatives to burning leaves and garbage along with modifying driving patterns and energy consumption can aid in reducing air pollution. Yard waste can be composted, chipped or disposed of through municipal collection services. Garbage can be managed by reducing the amount of waste created, reusing items, and recycling. Ground level ozone formation can be decreased by driving fewer miles, carpooling, and reducing the use of electricity.

Class Activities

Activity #1

Materials Needed:

Cleaning tools: broom, mop, dish cloth, sponge.

- Ask the children to identify cleaning tools and what each tool is used for. Ask whether they help clean up at home.
- Discuss how we all must help to keep the earth clean. Ask the children for their ideas about how to keep the earth clean.

Activity #2

Materials Needed:

Student Worksheet #3.

- Show the picture to the group (you may choose to color it first).
- Ask the children to identify unhealthy aspects of the picture: garbage, car exhaust, leaf burning.
- Explain why those aspects are harmful.
- Have the children color their own pictures.

School-Home Link

Materials Needed

School-Home Link #5.

- Send home a checklist of pollution decreasing activities that children can review with parents.
- Ask parents to make a pledge to participate in an activity the helps protect the environment, with instructions to return the pledge sheet the next day.
- Create a chart with the different activities that the children will participate in with their parents.
- Ask each child to share his or her experience with the class.

Books

Noise and Fumes by Donna Bailey

Keeping the Air Clean by John D. Baines

Caring for Our Air by Carole Greene

Pollution: Problems and Solutions by the National Wildlife Federation.

Student Activity Worksheet #3

Taking Action At Home

We can all help reduce air pollution. Please join us in teaching children how to decrease air pollution. Sign a pledge with your child on an activity that you could easily do to help keep our air healthy to breathe. The following tips for taking action are inexpensive and easy to do, and some will even save you money. Read this information and discuss different ideas with your child.

Everybody can make a contribution. Remember, it all adds up to cleaner air!

- Educate yourself and your family about air quality and recycling regulations in your area. For Example, you can find real-time ozone data, animated maps and ozone forecasts at the following web site: http://www.epa.gov/airnow/
- Tightly seal containers of household chemicals and gasoline to reduce the evaporation to chemicals into the air.
- Conserve energy in your home. Weatherize, use fluorescent lights or simply turn off lights and appliances not in use. This will help decrease the demand on the use of coal at power plants.

- Carpool or take the bus at least once a week.
- Don't burn trash or yard waste. Recycle instead.
- Get involved. Learn about Federal, State and Local regulatory actions affecting air quality in your community.

Car Care List:

- Drive a car that gets good gas mileage (>25 mpg).
- Get regular oil changes and tune-ups.
- Do not idle your car (turn it off and turn it on again later).
- Fill up your gas tank at night. (This reduces ozone formation in your area.)
- Keep your gas cap screwed on tight.

Asthma Checklist to Control Outdoor and Indoor "Triggers:"

Outdoor Triggers:

- Avoid heavy exercise when playing outside on hot humid days.
- Stay indoors when ozone levels are high.
- Be aware of changes in temperature or weather, these can affect children with asthma and allergies.

Indoor Triggers:

- Clean air conditioners and dehumidifiers regularly.
- Avoid electric fans.
- Wash bedding (sheets, pillows and blankets) in hot water to reduce dust mites.
- Dust with damp cloth.
- Remove carpets if possible.
- Check bathroom for leaks near sink and toilet.
- Ventilate bathroom to avoid mold buildup.
- Use dehumidifier in basement to keep low moisture levels.

Pledge Card to Help Reduce Air Pollution:

Make a pledge to help your child understand the importance of taking care of the environment. Pick one activity or action you and your child can do. Try to come up with your own ideas.

Examples of Things You Can Do:

- Read a book about air pollution.
- Plant a tree.
- Walk or bike to the store, church, or park instead of driving.
- Recycle.
- Turn off lights and appliances when not in use.
- Write to your U.S. Senators and Representatives to let them know you care about the environment.

Please sign and return this pledge card to your teacher.

We _____ *pledge*

Parent and child

to _____ *to help reduce air pollution.*

Activity

Glossary For Teachers

Air Pollutant: Any substance that can make the air dirty or harmful. Ozone is a pollutant because it makes the air unhealthy to breathe.

Air Pollution: The presence of contaminants or substances in the air that are harmful to people, plants, animals, or can affect welfare.

Alveoli: Tiny sac-like air spaces in the lung where carbon dioxide and oxygen are exchanged.

Asthma: A chronic lung disease caused by inflammation and obstruction of the airways.

Asthma Triggers: Conditions or stimuli that can cause an asthma attack, such as cold air, perfumes, and air pollution.

Carbon Dioxide: A waste gas resulting from chemical reactions in the body cells.

Carbon Monoxide: A colorless, odorless gas that is produced by incomplete combustion.

Criteria Air Pollutants: Air pollutants that have established concentration levels (or standards) set by the EPA. Criteria pollutants that are measured at levels higher than the set standards are considered unhealthy for people.

Environment: All the conditions, circumstances, and influences surrounding and affecting us.

Ground-level Ozone: Ozone that is formed when chemicals produced by cars, power plants, factories, and other pollutants are baked in the hot sun. Ground-level ozone makes it hard for us to breathe, and is harmful to the leaves of plants and trees.

Hemoglobin: Responsible for carrying oxygen in the blood.

Hydrocarbons: Chemical compounds consisting of Hydrogen and Carbon that are released during the burning of leaves, garbage, wood, and gasoline.

Immune System: Our defense system against infections.

National Ambient Air Quality Standards (NAAQS): Standards that must be attained and maintained in order to protect public health.

Nitrogen Oxide: A gas that is produced by combustion from cars and power plants. When Nitrogen Oxides are baked with VOCs in the hot summer sun, ground-level ozone is created.

Non-attainment Areas: Regions of the United States where air pollution (including ground-level ozone) has been measured at unhealthy levels. These regions are required by the Clean Air Act to reduce the amount of pollution in order to protect the health of people, plants and animals.

Oxygen: A colorless, odorless gas that makes up about 20% of the air we breathe. It is essential, because it is used for chemical reactions that occur in the body.

Ozone Action Day: A day on which the ozone levels are predicted to reach unhealthy levels. (Also called Clean Air Action Days.)

Particulate Matter: Fine liquid or solid particles, such as dust, smoke, mist, fumes, or smog found in air or emissions.

Secondary Sources: A pollutant created when two or more pollutants are mixed together and a chemical reaction happens to turn them into a new pollutant. Ground-level ozone is a secondary source because it is formed when the sun bakes two other pollutants, nitrogen oxides and VOCs.

Sulfur Dioxide: A heavy, colorless, odorous gas produced when fossil fuels, such as coal, are burned.

Volatile Organic Compounds (VOCs): Volatile means 'easily evaporated'-like water boiling away in a kettle. Volatile also means explosive. VOCs are chemical compounds that evaporate easily and may be explosive.

References:

Adler, David. 1991. *You Breathe In, You Breathe Out: All About Lungs.* New York, NY: F. Watts. ISBN: 0531107000.

Bailey, Donna. 1991. *Noise and Fumes.* New York, NY: F. Watts. ISBN: 0531110184.

_____. 1991. *Protecting Nature.* New York, NY: F. Watts. ISBN: 053111080X.

Baines, John D. 1998. *Keeping the Air Clean.* Austin, TX: Raintree Steck-Vaughn. ISBN: 0817249362.

Charman, Andrew. 1994. *Air.* Austin, TX: Raintree Steck-Vaughn. ISBN: 0811455092.

Cherkerzian, Diane. 1995. *Recyclables Fun: Creative Craft Ideas.* Honesdale, PA: Boyds Mills Press/ Bell Books. ISBN: 1563972751.

Donald, Rhonda Lucas. 2001. *Air Pollution.* New York, NY: Children's Press. ISBN: 0516221914.

Frost, Helen. 2001. *The Respiratory System.* Mankato, MN: Pebble Books. ISBN: 0736806520.

Gibbons, Gail. 1992. *Recycle: A Handbook for Kids.* Boston, MA: Little Brown. ISBN: 0316309710.

Glover, David. 1993. *Flying and Floating.* New York, NY: Kingfisher Books. ISBN: 185979377.

Greene, Carole. 1991. *Caring for Our Air.* Hillside, NJ USA: Enslow Publishers. ISBN: 0894903519.

National Wildlife Federation. 1999. *Pollution: Problems and Solutions.* Philadelphia, PA: Chelsea House Publishers. ISBN: 0791048829.

Nielsen, Shelly. 1993. *Love Earth: The Beauty Makeover.* Edina, MN: Abdo & Daughters. ISBN: 1562391984.

Ostrow, William and Vivian Ostrow. 1989. *All About Asthma.* Nile, IL: A Whitman. ISBN: 0807502766.

Patten Jr., John M. 1995. *Polluted Air.* Vero Beach, FL: Rourke Book Co. ISBN: 1559160985.

Pluckrose, Henry. 1994. *In the Air.* Chicago, IL: Children's Press. ISBN: 0516081187.

Stille, Darlene. 1990. *Air Pollution.* Chicago, IL: Children's Press. ISBN: 0516011812.

_____. 1997. *The Respiratory System.* New York, NY: Children's Press. ISBN: 0516204483.

Other Resources:

American Lung Association of Wisconsin
1-800-LUNG-USA
1-800-586-4872
URL: http://www.lungusa.org

Wisconsin Department of Natural Resources
Check the Education and Training Section for more educational resources or the Environmental Protection section for the Bureau of Air Management.
URL: http://dnr.wi.gov/

Air Quality Index (AQI): AirNow
URL: http://www.epa.gov/airnow/

EEK! (Environmental Education for Kids!)
URL: http://dnr.wi.gov/org/caer/ce/eek/

Asthma in the Air. (Eight minute video) Wisconsin Department of Natural Resources. PUB-CE-268 2000. To order call (608) 266-6790, or *URL: http://dnr.wi.gov/education/*

Environmental Defense
URL: http://www.scorecard.org/